INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-____
BERNARD TE VELDE, THE 2000 TE VELDE FAMILY TRUST,
DONALD J. CAMERON AND TERRANOVA RANCH, INC.
FRESNO COUNTY

Background

Bernard te Velde, The 2000 te Velde Family Trust, Donald J. Cameron and Terranova Ranch Inc. (hereafter "Discharger") have a wastewater agreement to transfer wastewater from the Lone Oak Dairy #2 (hereafter "facility") to 800 acres of cropland. The facility is near Helm, Fresno County, about seven miles southwest of Kerman. This dairy is regulated by the Waste Discharge Requirements General Order R5-2007-0035 for Existing Milk Cow Dairies (hereafter "General Order").

On 12 September 2007, the Discharger submitted an application form (Form 200) and a technical report generally describing the dairy operation and containing a plan to install a thermophilic anaerobic digester system (digester) on the facility to treat waste from the dairy operations and imported waste from various sources to produce biogas for sale to the regional gas utility company. Herd population data reported in the 2007 Report of waste Discharge (RWD) is summarized in Table 1.

Table 1

Holstein Herd Size and Composition

Animal	Head
Milk cow	2,560
Dry cow	430
Heifer (15-24 months)	1,150
Heifer (7-14 months)	870
Calves	260

The digester will be owned and operated by Microgy Inc., which is not name as a discharger in the proposed Order. The digester will include a 194,000-gallon capacity steel above ground tank (AGT) to store the supplemental feedstock, a 325,000-gallon capacity steel AGT mix tank, and two 1.5 million gallon AGT digester tanks, with appurtenant pumps and piping.

Digester operations will require the feed lanes and free stalls to be vacuumed or scraped rather than routinely flushed. The manure gathered will be added to the mix tank and diluted with freshwater and/or recycled digester effluent to about eight percent (8%) solids.

Supplemental feedstock will also be used in the digester. This supplemental feedstock has been described as food processing waste that may include: non-saleable (off-spec or out-of-date) materials, used cooking oil, grape seed oil, cottonseed oil, floor sweepings from food processing, (protein powders and sugary

flavorings), stillage from the manufacture of corn-based ethanol, and fatty water skimmings. Because the project is new, no information is yet available about feedstock in California. Microgy does operate three digesters in Wisconsin and estimated concentrations of some of the constituents are summarized in Table 2.

Table 2
Selected Constituents and Estimated Concentrations for Supplemental Feedstock

Constituent	Estimated Concentration
Calcium	984 mg/L
Chloride	2,874 mg/L
Iron	320 mg/l
Sodium	2,062 mg/L
Sulfur	867 mg/L
mg/L – milligrams per liter	

Approximately 41,205 gallons of manure from the mix tank and 16,795 gallons of supplemental feedstock tank will be added to the two digesters daily. The digesters will function as complete-mix reactors with a hydraulic retention time of approximately 21 days. Digester effluent will be removed from the digesters daily and pass through a screw press separator. Separated effluent liquid will be recycled to the manure mix tank or conveyed to the wastewater retention system for holding until it is applied to cropland. Separated digester solids will be stored on a concrete pad until they are used either onsite for animal bedding, applied to cropland, or exported from the facility.

Biogas produced during the digestion will be continuously extracted and conveyed to a moisture removal system on site. The biogas from this facility and two other nearby facilities (Johann Dairy and Maddox Dairy) will then be piped to an on-site central cleaning facility (biogas scrubber) where carbon dioxide and hydrogen sulfide will be remove prior to delivery to the natural gas pipeline. The digester project has not yet been constructed. A diagram of the digester installation is shown on Attachment D, which is attached hereto and made a part of this Order by reference.

The biological reaction within the biogas scrubber removes sulfur from the gas stream. Periodically, the biogas scrubber will be flushed with fresh water to remove the accumulated effluent from the reaction surfaces. The biogas scrubber effluent will consist mostly sulfuric acid (H_2S0_4) and will be discharged into the facility's

wastewater retention system. The anticipated characteristics of the dairy wastewater, digester effluent and biogas scrubber effluent are summarized in Table 3.

Table 3
Waste Characteristics

Constituent	Dairy Wastewater[1]	Digester Eflluent[2]	Biogas Scrubber Effluent[3]
Bicarbonate	2,206 mg/L	NR	NR
Calcium	175 mg/L	1,505 mg/L	ND
Carbonate	ND	NR	NR
Chloride	208 mg/L	1,185 mg/L	ND
Electrical Conductivity	4.230 µS/cm	NR	NR
Magnesium	85 mg/L	NR	27 ppm
Nitrate	3 mg/L	NR	NR
Nitrogen (Total)	320 mg/L	3,385 mg/L	159 mg/L
pH	7.4	8.3	1.4
Potassium	361 mg/L	2,208 mg/L	ND
Sodium	178 mg/L	1,092 mg/L	6 ppm
Sulfur	30 mg/L	362 mg/L	1,403 ppm
Total Dissolved Solids	2,283 mg/L	14,133 mg/L	4,000 mg/L

1 Based on average of 199 samples collected from 22 dairies in southern San Joaquin Valley
2 Reported by Larry Walker Associates email of 24 October 2007
3 Midwest Laboratories, Inc., Report of Analysis, Ref Lab # 212718, Report Number 07-297-5046 dated 10/30/07
mg/L – milligram per liter µS/cm – micro Siemens per centimeter ppm – parts per million
ND - not detected NR – not reported

There will be four waste streams and dilution water entering the wastewater retention ponds: process wastewater from the milk parlor, digester effluent, biogas scrubber effluent, and stormwater runoff from the production area. The Discharger reports that dilution water (fresh water) will be added to the wastewater retention system to reduce salt concentration. Given the operational parameters described in the Report of Waste Discharge, the annual average salinity concentration in the wastewater retention ponds should not exceed 4,100 milligrams per liter (mg/L) total dissolved solids (TDS) or 7,400 microSeimens per centimeter (uS/cm) electrical conductivity (EC).

The anticipated dairy and digester operations are estimated to generate approximately 32 million gallons or 4.5 million cubic feet of wastewater during a typical rainy season. The currently existing wastewater retention system does not appear to have adequate capacity (approximately 4.3 million gallons) to meet the Title 27 CCR §22562 and §22563 requirements.

Groundwater Conditions and Existing Land Use

Regional unconfined to semi-confined groundwater is approximately 170 feet below ground surface (bgs) and flows southwesterly, according to information in *Lines of Depth Elevation of Water in Wells in Unconfined and Semi-confined Aquifer*, published by DWR in Spring 2005. A semi-confined to confined aquifer occurs below the E-Clay layer of the Tulare Formation at depths below 500 feet bgs (lower aquifer). The E-Clay separates the upper aquifer from this lower aquifer. Although flow between the two aquifers was originally restricted, some agricultural wells within the vicinity are likely screened within the upper and lower aquifers. These wells allow hydraulic continuity between the upper and lower aquifers, resulting in lower quality water from the uppermost aquifer to migrate into the higher quality waters just above and below the E-Clay.

The facility obtains its source water from at least four wells. Reported analytical results for a sample collected in 2002 from an onsite water supply well were EC at 975 mhos/cm, nitrate as nitrogen at 0.7 mg/l, and TDS at 855 mg/l.

Land use surrounding the facility is predominantly agricultural with scattered farmsteads according land use data published in 2003 by the Department of Water Resources (DWR). Based on the 2003 DWR land use map, nearby crops include corn, cotton, wheat, alfalfa, and walnuts. Terranova Ranch, Inc. farms approximately 3,000 acres surrounding the current and proposed land application cropland of the facility. A 2007 Crop Map for Terranova Ranch, Inc., indicates surrounding crops for the facility include carrots, cotton, wine grapes, tomatoes, garlic, alfalfa, onions, wheat, corn, walnuts and almonds.

The facility is generally flat lying, underlain by mostly by fine sands, loams and silty clays. The most prevalent soils located at the facility are classified as Kimberlina saline alkali-Garces complex, Westcamp loam, Lakeside loam, Lakeside clay loam, and Armona loam. Permeability of the Westcamp Series soils is very slow. Permeability of the Lakeside Series soils is slow to very slow. Permeability of the Armona Series soils is moderately slow to slow.

Basin Plan, Beneficial Uses, and Regulatory Considerations

The Basin Plan indicates the greatest long-term problem facing the entire Tulare Lake Basin is increasing salinity in groundwater, a process accelerated by man's activities and particularly affected by intensive irrigated agriculture. Although a valley-wide salt drain is a desired future alternative for concentrated salt sources, Basin Plan policies and programs focus on controlling the rate of increase of salt in the Basin from all controllable sources, and particularly point sources of waste.

The procedure for the Regional Water Board to follow in establishing numerical limitations in waste discharge that will implement Basin Plan narrative objectives is described in pages IV-21 through IV-23 of the Basin Plan. The Regional Water Board must consider, among other things, information submitted by a Discharger and other interested parties and relevant numerical criteria and guidelines developed or published by other agencies and organizations on harmful concentrations of constituents.

The constituent concentrations to be included in the proposed Order and summarized in Table 4 are what the Basin Plan and referenced documents of recognized authorities indicate cannot be exceeded without causing some adverse impact on the listed beneficial uses. For agricultural use and the waste constituents listed, crop application is consistently more sensitive than animal uses, but there may be several concentration thresholds that apply dependent upon the crop and how irrigation takes place.

While insufficient data has been reported to establish background groundwater conditions, it appears that groundwater in the regional produciton aquifer beneath the facility is of good quality and suitable for all beneficial uses. This Order requires the installation of a groundwater monitoring network to monitor the impact of the discharge and help develop long-term groundwater limits, the development of which is discussed further in the Antidegradation section below

The Order uses the constituent concentrations summarized in Table 4 as interim groundwater limitations while a Groundwater Limitations Analysis is performed to determined if more stringent groundwater limitations are needed to protect water quality. These interim groundwater limitations are based on either the maximum contaminant level (MCL) for the constituent as published in Title 22 CCR or other designated Basin Plan objectives.

Table 4
Summary of Interim Receiving Water Numerical Limitations

Constituent	Units	Value	Beneficial Use	Criteria or Justification
Boron	mg/L	1.0	AGR[2]	Boron sensitive crops[3]
Chloride	mg/L	250	MUN[1]	Recommended Secondary MCL[5]
Conductivity (EC)	µmhos/cm	900	MUN[1]	Recommended Secondary MCL[5]
Nitrate as N	mg/L	10	MUN[1]	Primary MCL[4]
Total Coliform Organisms	MPN/ 100 mL	2.2	MUN[1]	Basin Plan
Total Dissolved Solids	mg/L	500	MUN[1]	Recommended Secondary MCL[4]

Notes:
1 - Municipal and domestic supply
2 - Agricultural supply
3 - Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome, (1985)
4 - Title 22, CCR, section 64431, Table 64431-A
5 – Title 22, CCR, section 64449, Table 64449-B

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Resolution 68-16" require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with the maximum benefit to the people of the State." Policy and procedures for complying with this directive are set forth in the Basin Plan.

Certain dairy and digester wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Degradation is likely to occur from waste handling and storage and application of wastes to cropland. However, there is some uncertainty over the degree of that degradation given that the combined dairy discharge has not been initiated.

Digester effluent quality data used to develop this Order comes from one of Microgy's digesters in Wisconsin and while it is sufficient to provide a general understanding of the character of the discharge it is insufficiently detailed to perform a BPTC analysis or set consistent long-term groundwater limits that reflect full implementation of BPTC. Given the limited information, this Order takes a phased approach. Interim

groundwater limitations assure protection of the existing beneficial uses of groundwater while this process takes place.

The Order first requires technical reports in the form of a BPTC technical evaluation for each component of the facility's waste treatment and control to determine for each waste constituent BPTC as used in Resolution 68-16, a Nutrient Management Plan (NMP) for the cropland, and Salinity Evaluation and Minimization Plan for salinity control of facility waste. The results of these technical evaluations and water quality data from required groundwater monitoring will be used to develop numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives foreach constituent. Lastly, the Order may be reopened to incorporate changes to the interim groundwater water limitations, or waste handling and treatment technologies, deemed necessary to implement BPTC.

Proposed Order Terms and Conditions

The recently adopted Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) has set new standards for waste management on dairy facilities. The requirements specified in the propose Order largely reflect those of the Dairy General Order except where specific circumstances require different or more stringent discharge specifications or provisons.

California Environmental Quality Act (CEQA)

This Order rescinds the dairy's coverage under the Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order). The Dairy General Order was found to be exempt from CEQA provided that the dairy did not expand its cow numbers beyond those that existed as of 17 October 2005. Prohibition A.10 of this Order prohibits the Discharger from exceeding their October 2005 herd numbers, with a 15 percent increase allowance to accommodate normal fluctuations in herd size.

For the digester project at this facility, the San Joaquin Valley Air Pollution Control District (SJVAPCD) is the lead agency pursuant to CEQA and has prepared an Initial Study and a Mitigated Negative Declaration. The Regional Water Board, as a responsible agency for the purposes of CEQA, reviewed and will considered the Mitigated Negative Declaration prepared by SJVAPCD in _____. [As of the date of the draft Information Sheet, the Regional Water Board has not received the lead agency's CEQA documents but has consulted regarding water quality issues. The findings and, if necessary, requirements of the proposed Order will be revised following review of the Mitigated Negative Declaration.]

Discharge Prohibitions, Specifications and Provisions

The proposed Order prohibits the discharge of wastes to surface water. This includes natural and man-made water bodies and conveyances whether surface water is present or not at the time of discharge. In the event such a discharge occurs due to a failure of proper waste management, the proposed Order specifies monitoring and mitigation of the surface water body affected. The actions required by the proposed Order include:

- Immediate termination of the discharge.
- Notification of regulatory agencies (Regional Water Board, County Health Department, Fish & Game, etc.) within 24 hours of discovery.
- Investigation to determine the extent and magnitude of the discharge impact.
- Mitigation of the degradation caused by the discharge.
- A plan to prevent recurrence of the discharge.

This proposed Order prohibits discharge of waste to groundwater that causes or contributes to exceedances of water quality objectives. This proposed Order reduces the threat of degradation of groundwater by requiring the Discharger to:

- Submit a hydrogeologic report for the area affected or potential affected by the facility to the Executive Officer. The technical report shall describe the underlying geology, existing wells (active or otherwise), well restrictions, and hydrogeology. The report shall include a Monitoring Well Installation Work Plan that recommends a monitoring well network to collect data from the unconfined to semi-confined, regional production aquifer up gradient from the influence of the facility and down gradient from each of the waste management areas (e.g., corrals, wastewater retention ponds, digester works, and cropland). The network shall be sufficient to evaluate performance of BPTC measures and to determine compliance with the Order's Groundwater Limitations. The recommendations shall be reviewed and approved by the Executive Officer..
- Conduct a performance evaluation of existing waste handling equipment, facilities, and an evalution of BPTC for the waste handling and disposal activity. A critical waste management element to be evaluated is the existing wastewater retention system. The wastewater retention ponds must be evaluated for their effectiveness to control seepage of wastewater to the upper regional aquifer below the shallow water zone. The report must include a review of treatment and control technologies, and propose BPTC measure for retention ponds.

- Develop and implement a Waste Management Plan (WMP) to document waste handling and management measures. If the existing conditions do not comply with Title 27 confined animal facility regulations, interim modifications would be proposed to mitigate the problems. The WMP will be include a schedule of milestones and completion dates for any necessary construction and/or retrofitting of the existing physical plant.
- Develop and implement and a Nutrient Management Plan (NMP) to implement waste applicaton practices in the cropland. The NMP will provide a schedule of waste and irrigation water application formulated to meet the crop needs in each field. The NMP will provide for sampling plan for wastewater, soil, crop tissue, and irrigation water, to collect the data needed to manage waste applications.
- Develop a Salinity Evaluation and Minimization Plan that identifies sources of salt in waste generated at the facility both in the dairy and digester operations. The report should evaluate measures that can be taken to minimize salt in the facility waste, and provide a schedule to implement these measures identified to minimize salt in the waste with the NMP.
- Develop and implement groundwater monitoring to assess the performance of the facility in meeting this proposed Order's specfications and limitations.
- Prepare a final Groundwater Limitations Analysis to propose specific numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for each constituent. The data from the groundwater monitoring program and the monitoring provisions of the NMP will be used to measure the facilitiy's performance. This data will be used in the Groundwater Limitations Analysis to formulate the subsequent final groundwater limitations.

Initial Compliance Monitoring

This Order prescribes monitoring of digester effluent, biogas scrubber effluent, wastewater in the retention ponds, and fresh irrigation water. Monthly (and weekly during the rainy season) monitoring of wastewater retention ponds' freeboard to ensure the wastewater retention systems has sufficient capacity to meet the requirements of Title 27 §22562 (a) (i.e., sufficient to retain facility wastewater generated and stormwater runoff from the 25-year, 24-hour storm). Monitoring of the wastewater application amount(s) to cropland by field and monthly monitoring of the mineral and nitrogen character of the digester effluent, wastewater in the retention ponds, and fresh irrigation water are necessary to determine: 1) the amount and basic quality characteristics of the discharge, 2) if the contents of the wastewater retention

system are complying with discharge limits for TDS or EC, 3) if the application to cropland is meeting crop needs and not exceeding the salt application limitations, and 4) if there is a material charge in the discharge.

The Discharger must monitoring groundwater for waste constituents expected to be present in the discharge,capable of reaching groundwater, and exceeding the groundwater limitations iftreatment, control, and environmental attenuation, proves inadequate. For each constituent listed in Section D Interim Groundwater Limitations, of the Order, the Discharger must, as part of each monitoring event compare concentrations of constituents found in each monitoring well (or water supply well) to the background concentration or to prescribe numerical limitations to determine compliance.

Reopener

The conditions of discharge in the proposedOrder were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final groundwater limitations, so the proposed Order sets limitations for the interim while site-specific, constituent-specific limits are developed in conjunction with a BPTC evaluation. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality possible that could involve substantial cost. It may be appropriate to reopen the Order if applicable laws, regulations, or site conditions change.